FUNGI ON THE HAIR OF SMALL MAMMALS IN EGYPT

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ABSTRACT - Hair samples from small mammals were examined for the presence of keratinophilic and saprophytic fungi. 119 specimens were examined of which 58 were from rabbits, 25 from guinea pigs, 20 from mice, 14 from cats and 2 from rats. 23 genera and 53 species were isolated. The commonest in order of frequency were members of the genera *Aspergillus* and *Penicillium*. In low frequency, several dermatophytes (*Trichophyton, Microsporum* and *Arthroderma*) were recovered as well as some other fungal species pathogenic to man and animals (*Myceliophthora, Chaetomium, Mucor, Fusarium, Rhizopus, Syncephalastrum, Botryotrichum, Cladosporium, Alternaria, Scopulariopsis, Circinella, Cylindrocarpon, Arthrobotrys, Drechslera, Trichoderma, Humicola* and *Acremonium*).

RÉSUMÉ - 23 genres et 53 espèces de champignons kératinophiles et saprophytes ont été isolés à partir de 119 échantillons de poils de petits mammifères (lapins, cobayes, souris, chats, rats). Les champignons les plus communs appartiennent aux genres *Aspergillus* et *Penicillium*. En faible fréquence, plusieurs dermatophytes furent isolés (*Trichophyton, Microsporum* et *Arthroderma*), ainsi que quelques autres espèces pathogènes de l'homme et d'animaux (*Myceliophthora, Chaetomium, Mucor, Fusarium, Rhizopus, Syncephalastrum, Botryotrichum, Cladosporium, Alternaria, Scopulariopsis, Circinella, Cylindrocarpon, Arthrobotrys, Drechslera, Trichoderma, Humicola* and *Acremonium*).

KEY WORDS : Keratinophilic fungi, dermatophytes, Egypt.

INTRODUCTION

Small free living mammals have been recognized as a source of both human and animal dermatophytes caused by the fungi (Ajello, 1959; Otcenasek & Dvorak 1962; Rees, 1967; Gugnani et al., 1975; Hubalek et al., 1979; Otcenasek et al., 1980; Aho 1983), and the isolations of dermatophytes and other keratinolytic fungi from the hair of mammals has been reviewed by several authors (Ajello, 1959; Marples, 1961, 1967; Otcenasek & Dvorak, 1962; Varsavsky & Ajello, 1964; Alteras et al., 1966; Smith et al., 1969; Hoffmann et al., 1970; Knudston & Roberstad, 1970; Mantovani & Morganti, 1971; Houin et al., 1972; Gugnani et al., 1975).

In Egypt, Bagy (1986) studied the frequency of fungi on the hair samples from dog, donkey and cow. Also, Bagy & Abdel-Hafez (1985) studied

Table 1: The occurrence of fungi on hair samples from Rabbits, Guinea pigs, Mice, Cats and Rats.
Tableau 1: Champignons isolés à partir d'échantillons de poils.

Genera and species	Rabbit (58) NCI	%	Guinea pig (25) NCI	%	Mice (20) NCI	%	Cat (14) NCI	%	Rat (2) NCI	%	Total (119) NCI	%
Aspergillus	58	100	20	80	14	70	11	78	2	100	105	88
A. fumigatus Fresenius	22	27	12	48	7	35	5	35	2	100	48	40
A. flavus Link	18	31	3	12	4	20	2	14	–	–	27	22
A. niger van Tieghem	14	24	5	20	3	15	3	21	–	–	25	21
A. terreus Thom	2	3	–	–	–	–	–	–	–	–	2	1
A. sydowii (Bain. & Sart.) Thom & Church	2	3	–	–	–	–	–	–	–	–	2	1
A. nidulans (Eidam) Winter	–	–	–	–	–	–	1	7	–	–	1	0.8
Penicillium	58	100	7	28	15	75	8	57	2	100	90	75
P. chrysogenum Thom	36	62	4	16	10	50	6	42	2	100	58	48
P. martensii Biourge	4	6	1	4	5	25	2	14	–	–	12	10
P. funiculosum Thom	6	10	1	4	–	–	–	–	–	–	7	6
P. purpurogenum Stoll	6	10	–	–	–	–	–	–	–	–	6	5
P. corylophilum Dierckx	2	3	1	4	–	–	–	–	–	–	3	2
P. brevicompactum Dierckx	2	3	–	–	–	–	–	–	–	–	2	1
P. variabile Sopp	2	3	–	–	–	–	–	–	–	–	2	1
Chrysosporium	58	100	9	36	2	10	8	57	2	100	79	66
C. indicum (Rand. & Sand.) Garg	24	41	3	12	–	–	3	21	–	–	30	25
C. tropicum Carmichael	16	27	3	12	–	–	2	14	–	–	21	17
C. keratinophilum (Frey) Carmichael	12	20	–	–	2	10	2	14	2	100	18	15
C. parvum (Emmons & Ashburn)	2	3	2	8	–	–	–	–	–	–	4	3
C. pannorum (Link) Hugh.	2	3	–	–	–	–	–	–	–	–	2	1
C. xerophilum Pipitt	2	3	–	–	–	–	–	–	–	–	2	1
C. dermatitidis (Gilchrist & Stokes) Carmichael	–	–	1	4	–	–	–	–	–	–	1	0.8
C. queenslandicum Apinis & Rees	–	–	–	–	–	–	1	7	–	–	1	0.8
Mycetiophthora	18	31	8	32	4	20	2	14	1	50	33	27
M. anamorph of *Corynascus sepedonium* Emmons	18	31	8	32	4	20	1	7	1	50	32	26
M. anamorph of *Corynascus novoguineensis* Udagawa & Horie	–	–	–	–	–	–	1	7	–	–	1	0.8

Genera and species	Rabbit (58) NCI	%	Guinea pig (25) NCI	%	Mice (20) NCI	%	Cat (14) NCI	%	Rat (2) NCI	%	Total (119) NCI	%
Trichophyton	21	36	10	40	2	10	6	42	–	–	39	33
T. equinum (Matruchot & Dassonville) Goedels	7	12	10	40	2	10	4	28	–	–	23	19
T. mentagrophytes (Robin) Blanchrad	14	24	–	–	–	–	2	14	–	–	16	13
Microsporum	24	41	5	20	–	–	–	–	–	–	29	24
M. boullardii Dominik & Majchrowicz	20	34	3	12	–	–	–	–	–	–	23	19
M. racemosum Borelli	4	6	2	8	–	–	–	–	–	–	6	5
Chaetomium globosum Kunze ex Fries	8	13	13	52	2	10	2	14	1	50	26	21
Mucor	18	31	2	8	1	5	2	14	–	–	23	19
M. hiemalis Wehmer.	18	31	1	4	1	5	1	7	–	–	21	17
M. racemosus Fresenius	–	–	1	4	–	–	1	7	–	–	2	1
Fusarium	8	13	5	20	2	10	1	7	1	50	17	14
F. equiseti (Corda) Saccardo	2	3	3	12	–	–	–	–	1	50	6	5
F. moniliforme Sheldon	6	10	–	–	–	–	–	–	–	–	6	5
F. solani (Martius) Saccardo	–	–	2	8	1	5	–	–	–	–	3	2
F. oxysporum Schlechtendahl	–	–	–	–	1	5	1	7	–	–	2	1
Rhizopus	10	17	3	12	1	5	1	7	–	–	15	12
R. oryzae Went & Geerligs	8	13	3	12	1	5	1	7	–	–	13	10
R. stolonifer (Ehrenb. ex. Fries) Lind.	2	3	–	–	–	–	–	–	–	–	2	1
Syncephalastrum racemosum Cohn ex. Schoret.	8	13	2	8	1	5	–	–	1	50	12	10
Botryotrichum piluliferum Saccardo & Marchal	8	13	–	–	1	5	1	7	–	–	10	8
Cladosporium cladosporioides (Fres.) de Vries	6	10	3	12	–	–	–	–	–	–	9	7
Alternaria alternata (Fr.) Keissler.	6	10	–	–	1	5	1	7	–	–	8	6
Scopulariopsis brevicaulis (Sacc.) Bain.	2	3	2	8	2	10	2	14	–	–	8	6
Circinella muscae (Sorok) Berl. & Detoni	6	10	–	–	–	–	–	–	–	–	6	5
Cylindrocarpon cylindroides Wollen	4	6	1	4	1	5	–	–	–	–	6	5
Arthrobotrys oligospora Corda	4	6	–	–	–	–	–	–	–	–	4	3
Drechslera spicifera (Bain.) Von Arx	–	–	2	8	1	5	–	–	1	50	4	3
Trichoderma viride Pers. ex. Fr.	2	3	1	4	–	–	–	–	–	–	3	2
Humicola fuscoatra Traaen	–	–	2	8	–	–	–	–	–	–	2	2
Acremonium strictum W. Gams	–	–	1	4	–	–	–	–	–	–	1	0.8

NCI = Number of cases of isolation. % = percentage count of occurrence.

the mycoflora of camel and goat hairs. The present investigation was undertaken to examine the occurrence of fungi on hair samples taken from rabbit, guinea pig, mice, cat and rat.

MATERIAL AND METHODS

119 hair samples from rabbit, guinea pig, mice, cat and rat were collected from faculty of Agriculture and animal house of Faculty of Science, Assiut University. These samples were placed in a clean plastic bag and transferred immediately to the laboratory. The hair samples were placed on sterile soil moistened with sterile distilled water, remoistened whenever necessary, and incubated at room temperature for up to 10 weeks. The moulds which appeared on the baits were transferred to the surface of Sabouraud's dextrose agar medium (Moss & McQuown, 1969) which was supplemented with 20 units/ml of sodium penicillin and 40 µg/ml of dihydrostreptomycin. The plates were incubated at 28°C for 3-4 weeks and the developing colonies were examined and identified.

RESULTS AND DISCUSSION

53 species which belong to 23 genera were recovered from rabbit, guinea pig, mice, cat and rat hairs (Table 1). *Aspergillus* was the most common genus on the hair of rabbit, guinea pig, mice, cat and rat and was encountered in 100, 80, 70, 78 and 100% of the samples respectively. Six species of *Aspergillus* were isolated from the five types of hair and these were *A. fumigatus* (40%), *A. flavus* (22%), *A. niger* (21%), *A. terreus* (1%), *A. sydowii* (1%) and *A. nidulans* (0.8%). Bagy (1986) isolated *A. flavus*, *A. sydowii*, *A. nidulans* and *A. fumigatus* from the hair of dog, donkey and cow and they were occurred in 4.6, 2.7, 2.3 and 0.8% of the samples respectively. Bagy & Abdel-Hafez (1985) also isolated *A. niger* (19.2%), *A. flavus* (13.3%), *A. sydowii* (10%), *A. nidulans* (9.2%), *A. fumigatus* (2.5%), *A. tamarii* (2.5%), *A. ustus* (2.5%) and *A.ochraceus* (1.7%) from the hair of camel and goat.

Penicillium was the second most frequent genus on the hair of rabbit, guinea pig, mice, cat and rat and emerged in 100, 28, 75, 57 and 100% of the samples respectively. It was represented by seven species of which *P. chrysogenum* was the most common species on the hair of the five animals. Bagy & Abdel-Hafez (1985) isolated *P. chrysogenum* (5%), *P. verruculosum* (3.3%), *P. funiculosum* (1.7%) and *P. islandicum* (0.8%) from the hair of camel and goat.

Chrysosporium came in third position. It was recorded in 100, 36, 10, 57 and 100% of rabbit, guinea pig, mice, cat and rat hair, respectively. Eight species of *Chrysosporium* were isolated from the five types of hair. *C. indicum* and *C. tropicum* occurred in 41, 12 and 21%, and 27, 12 and 14% of rabbit, guinea pig and cat hair respectively. Bagy & Abdel-Hafez (1985) isolated *C. indicum* from the hair of camel and goat which emerged in 8.3 and 20% of the samples respectively. *C. tropicum* was isolated from mammals in

Australia by Rees (1967), in Venezuela by Moraes et al. (1967), in India by Gugnani et al. (1975) and in Egypt by Bagy (1986).

C. keratinophilum was encountered in 20, 10, 14 and 100% of rabbit, mice, cat and rat hair respectively. It was isolated from mammals in Czechoslovakia (Otcenasek & Dvorak, 1962), Germany (Hoffmann et al., 1970), India (Gugnani et al., 1975) and Egypt (Bagy, 1986; Bagy & Abdel-Hafez, 1985). Bagy (1986) reported that *C. keratinophilum* was the most common species on the hair of dog, donkey and cow and was represented in 15.3, 32.9 and 22.1% of the samples respectively.

Five species of *Chrysosporium* were of less frequencies and these were *C. parvum* (rabbit, guinea pig), *C. pannorum* (rabbit), *C. xerophilum* (rabbit), *C. dermatitidis* (guinea pig) and *C. queenslandicum* (cat). Bagy & Abdel-Hafez (1985) isolated *C. pannorum*, *C. parvum* and *C. dermatitidis* less frequently from camel and goat hair (4.2, 1.7 and 0.8% of mammals examined respectively).

Myceliophthora occupied the fourth place and was represented by two species namely, *M.* anamorph of *Corynascus sepedonium* and *M.* anamorph of *Corynascus novoguineensis*. *M.* anamorph of *C. sepedonium* was isolated from the five types of hair comprising 26% of mammals examined. *M.* anamorph of *C. novoguineensis* was recorded only in cat hair constituting 0.8% of mammals examined. Bagy & Abdel-Hafez (1985) isolated *Myceliophthora vellerea* in low frequency from camel and goat hair (0.8% of mammals examined).

Trychophyton occupied the fifth place and was encountered in 36, 40, 10 and 42% of rabbit, guinea pig, mice and cat hair respectively. It was represented by two species namely, *T. equinum* and *T. mentagrophytes*.

Microsporum occupied the sixth place and was represented by two species namely, *M. boullardii* and *M. racemosum*. They were isolated only from rabbit and guinea pig hair. The isolation of dermatophytes and other keratinophilic fungi *(Trichophyton mentagrophytes, T. phaseoliforme, T. ajelloi, T. simii, T. terrestre, Microsporum racemosum, M. gypseum, M. persicolor, Arthroderma ciferri* and *A. insigulare)* from the hair of small free living mammals have been recorded by many workers (Ajello, 1959; Otcenasek & Dvorak, 1962; Varsavsky & Ajello, 1964; Borelli, 1965; Borelli & Feo, 1966; Houin et al., 1972 and Hubalek et al., 1979).

Chaetomium globosum, Mucor hiemalis, Fusarium spp., *Rhizopus oryzae, Syncephalastrum racemosum, Arthroderma* sp., *Botryotrichum piluliferum, Cladosporium cladosporioides, Alternaria alternata* and *Scopulariopsis brevicaulis* were isolated in low frequency from the five types of hair tested and were represented in 6-21% of the samples.

Circinella muscae, Cylindrocarpon cylindroides, Arthrobotrys oligospora, Drechslera spicifera, Trichoderma viride, Humicola fuscoatra and *Acremonium strictum* were less common and emerged in 0.8-5% of the samples of mammals tested (Table 1).

Most of the preceeding genera and species were isolated previously from the hairs of dog, donkey, cow, camel and goat as recommended by Bagy (1986) and Bagy & Abdel-Hafez (1985).

REFERENCES

AHO R., 1983 - Saprophytic fungi isolated from the hair of domestic and laboratory animals with suspected dermatophytosis. *Mycopathologia* 83: 65-73.

AJELLO L., 1959 - A new *Microsporum* and its occurrence in soil and on animals. *Mycologia* 51: 69-76.

ALTERAS I., NESTEROV V. and CIOLOFAN I., 1966 - The occurrence of dermatophytes in wild animals from Romania. *Sabouraudia* 4: 215-218.

BAGY M.M.K. and ABDEL-HAFEZ A.I.I., 1985 - Mycoflora of camel and goat hairs from Al-Arish, Egypt. *Mycopathologia* 92: 125-128.

BAGY M.M.K., 1986 - Fungi on the hair of large mammals in Egypt. *Mycopathologia* 93: 73-75.

BORELLI D., 1965 - *Microsporum racemosum* nova species. *Acta Med. Venezolana* 12: 148-151.

BORELLI D. and FEO M., 1966 - *Trichophyton phaseoliforme* nova species. *Med. Cutan.* 1: 165-172.

GUGNANI H.C., WATTAL B.L. and SANDHU R.S., 1975 - Dermatophytes and other keratinophilic fungi recovered from small mammals in India. *Mykosen* 18: 529-538.

HOFFMANN R., KOLIPP D. und KOCH H.A., 1970 - Die Bedeutung von Mäusen und andern Kleinsäugern für die Verbreitung von Dermatophyten und andern keratinophilen Pilzen. *Mykosen* 13: 383-387.

HOUIN R., ROUGET-CAMPANA Y., LE FICHOUX Y., LANCASTRE F., BAZIN J.C., DENIAU M. et BOLOGNINI J., 1972 - Isolement de *Trichophyton mentagrophytes* (Rohin) Blanchard 1896, *Nannizzia persicolor* Stockdale 1967 et *Trichophyton terrestre* Durie et Frey 1957, du pelage de rongeur. *Ann. Parasitol. Humaine Comp.* 47: 421-429.

HUBALEK Z., ROSICKY B. and OTCENASEK M., 1979 - Fungi on the hair of small wild mammals in Czechoslovakia and Yugoslavia. *Ceskà Mykol.* 33: 81-93.

KNUDSTON W.U. and ROBERTSTAD G.W., 1970 - The isolation of keratinophilic fungi from soil and wild animals in south Dakota. *Mycopathologia* 40: 309-323.

MANTOVANI A. and MORGANTI L., 1971 - Ricerche sui dermatofiti dei mammiferi in Italia. *Vet. Ital.* 22: 460-471.

MARPLES M.J., 1961 - Some extra-human reservoirs of pathogenic fungi in New Zealand. *Trans. Roy. Soc. Trop. Med.* 55: 216-220.

MARPLES M.J., 1967 - Non-domestic animals in New Zealand and in Rarotonga as a reservoir of the agents of ringworm. *New Zealand. Med. J.* 66: 299-302.

MORAES M., BORELLI D. and FEO M., 1967 - *Microsporum amazonicum* nova species. *Med. Cutan.* 2: 281-286.

MOSS E.S. and McQUOWN A.L., 1969 - *Atlas of Medical Mycology*, 3rd ed. Baltimore, Williams & Wilkins Comp.

OTCENASEK M. and DVORAK J., 1962 - The isolation of *Trichophyton terrestre* and other keratinophilic fungi from small mammals of south eastern Moravia. *Sabouraudia* 2: 111-113.

OTCENASEK M., HUBALEK Z. and SIXL W., 1980 - Survey of dermatophytes in the hair of small mammals from Austria. *Folia Parasitol. (Praha)* 27: 83-87.

REES R.G., 1967 - Keratinophilic fungi from Queensland. I. Isolations from animal hair and scales. *Sabouraudia* 5: 165-172.

SMITH J.M.B., RUSH-MUNRA F. and McCARTHY M., 1969 - Animals as a reservoir of human ringworm in New Zealand. *Austral. J. Dermatol.* 10: 169-182.

VARSAVSKY E. and AJELLO L., 1964 - The perfect and imperfect forms of a new keratinophilic fungus *Arthroderma ciferrii* sp. nov. *Trichophyton georgii* sp. nov. *Rivista Patol. Veg.*, Ser. 3, 4: 351-364.